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FOREST DISEASES

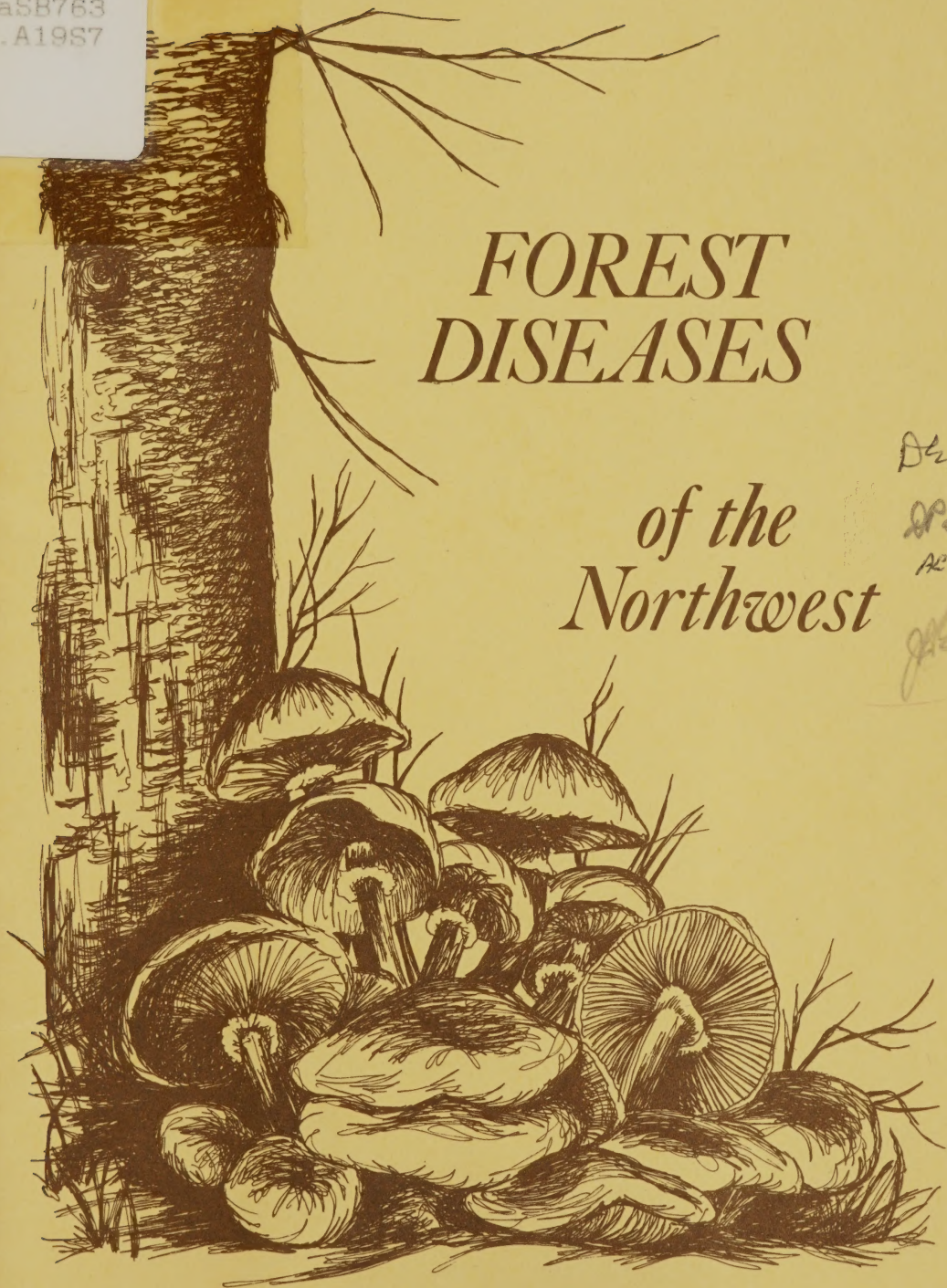
*of the
Northwest*

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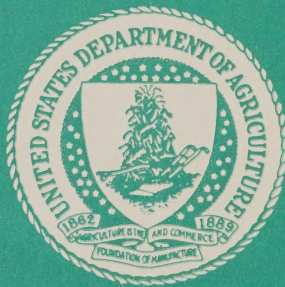
FOREWORD

Increasing demands are being placed on the forests of the Pacific Northwest—Washington and Oregon—to provide wood, water, forage, wildlife, and recreation for a growing population. All factors which limit the production of these values must be evaluated. Although precise data are not available, this report represents the best available evaluation of one of these limiting factors—forest diseases. To reduce the impact of disease, new information must be developed through research and applied in improved forest management practices.

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FOREST DISEASES
of the
PACIFIC NORTHWEST

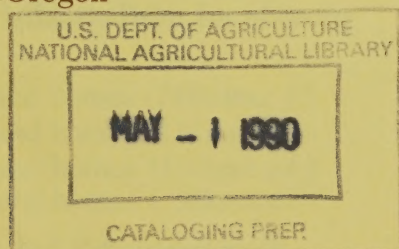
by

James L. Stewart
Forest Pathologist
Pacific Northwest Region

and

Keith R. Shea
Forest Pathologist
Pacific Northwest Forest and
Range Experiment Station

Portland, Oregon



Illustrated by Jackie D. Atzet

IMPACT OF DISEASE

DISEASES reduce forest productivity in Oregon and Washington by over 400 million cubic feet (3.1 billion board feet) each year. This impact equals almost 13 percent of the annual growth and is equivalent to lumber for over 200,000 average homes.








Dwarf mistletoes, root rots, and heart rots are the principal diseases but others—foliage diseases, cankers, and stem rusts — are increasingly important. Non-infectious diseases — air pollution, climatic extremes, and nutritional disorders, for example—also cause sizable but unmeasured losses.

Forest tree diseases cause *growth loss*—growth that would have occurred if a disease was not present, *mortality*—trees that die because of disease, and *cull*—wood made unusable by disease. Diseases also destroy aesthetic values, create hazardous conditions in campgrounds and public use areas, and seriously disrupt long-term forest management plans.










Disease incidence is closely related to the forest environment be it a natural environment or one created by man. Many forest diseases can be prevented or their damage reduced through application of sound forest management practices. Forest practices are evolving which will reduce the impact of diseases and provide an aesthetically pleasing forest environment.

ANNUAL DISEASE IMPACT










CULL each  = 10 thousand average homes

DWARF MISTLETOE	-
ROOT ROTS	-
HEART ROTS	     
OTHER	

MORTALITY

DWARF MISTLETOE	   
ROOT ROTS	  
HEART ROTS	
OTHER	

GROWTH LOSS

DWARF MISTLETOE	   
ROOT ROTS	  
HEART ROTS	-
OTHER	 

TOTAL LOSS 224 Thousand Average Homes
or 403 Million Cubic Feet

Dwarf Mistletoe	82 thousand homes (148mm.c.f.)
Root Rots	64 thousand homes (115mm.c.f.)
Heart Rots	61 thousand homes (110mm.c.f.)
Other	17 thousand homes (30mm.c.f.)

Average Home = 11 thousand bd. ft. or 1.8 thousand cu. ft.

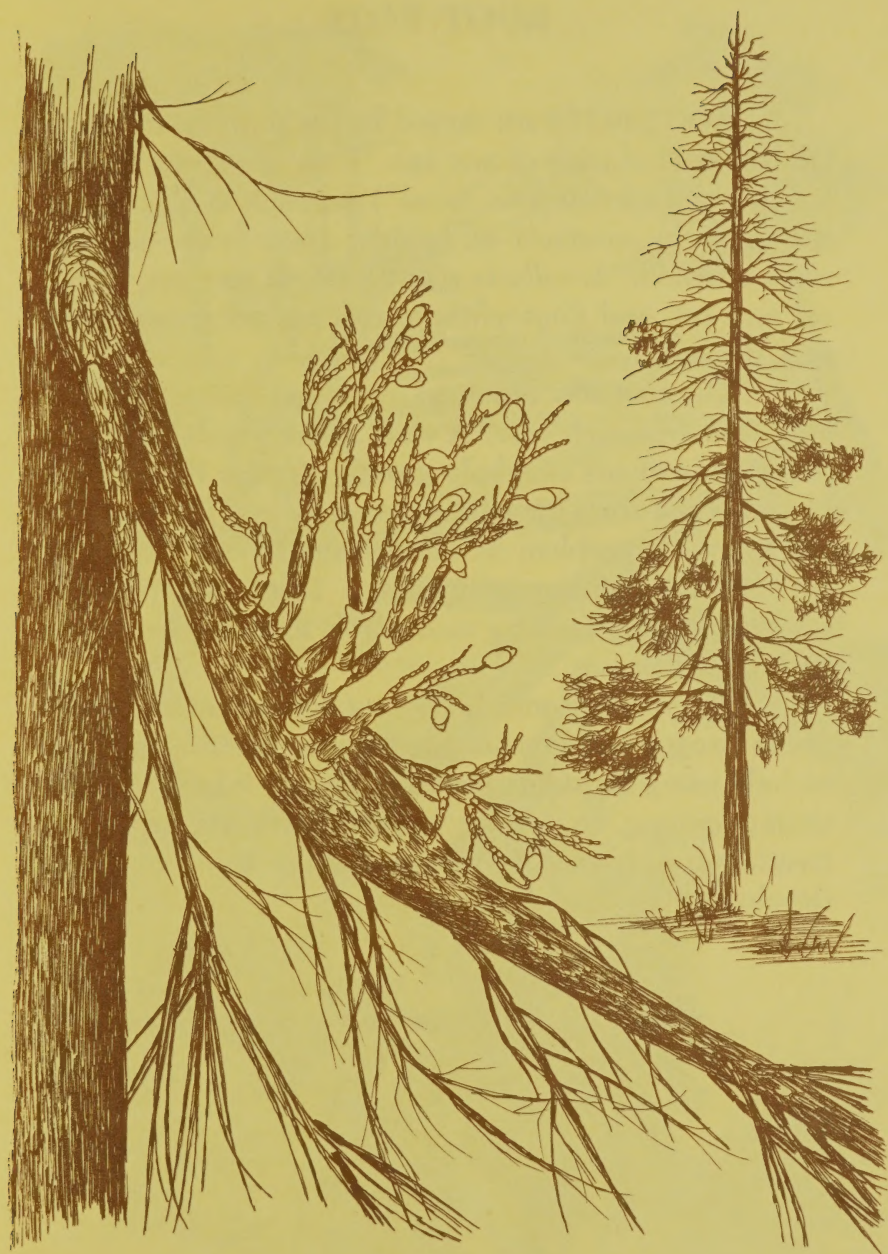
DWARF MISTLETOES

DWARF MISTLETOES are parasitic, seed-bearing plants that infect most conifer trees in the West. They are dependent on the tree for water and food. Infected branches of a tree are able to rob the uninfected parts of some of their food and water. This causes the tree to grow slower and slower until the tree dies prematurely. The parasite is spread by seeds which when ripe are shot from the fruit as far as 60 feet at speeds of 60 miles per hour.

Dwarf mistletoes cause an estimated loss of 174 million cubic feet of wood each year in Oregon and Washington. This is equivalent to burning 16,000 acres every year of 100-year-old Douglas-fir forests on the west side of the Cascades or 29,000 acres of ponderosa pine on the east side.

Forests that have been infested for many years become so decadent that they are also undesirable to many species of wildlife, difficult and hazardous to hike through, unpleasant to look at, and extremely susceptible to catastrophic fire.

No chemicals are used for the control of dwarf mistletoe. Foresters control dwarf mistletoes by cutting infected trees to prevent spread to new young trees. Much research is needed, however, to improve this technique.



ROOT ROTS

ROOT ROTS are caused by fungi that invade and kill the roots of trees of any age. They are spread either by spores (microscopic "seed") carried in the air or water, or by contacts of healthy roots with diseased roots or wood. *Armillaria* root rot, *Poria* root rot, *Anno-sus* root rot, and *Phytophthora* root rot are examples of root diseases.

The root rots cause an estimated loss of 115 million cubic feet each year. A walk in the woods will often reveal individuals or whole groups of trees tipped over because their roots have been rotted away. The root rots are a serious problem in campgrounds where a falling tree can cause injury or damage. Trees with partially rotted roots also are very susceptible to attack by insects and other diseases.

No proven controls for root rots are available for use in Oregon and Washington forests. Possible methods include using resistant species in known infection areas, timing cutting to reduce opportunities for infection, treating freshly cut stumps to prevent infections, and developing resistant tree varieties.



HEART ROTS

HEART ROTS are caused by fungi that invade and decay the heartwood of trees. They are spread by airborne spores which enter the tree through wounds or branch stubs. The decayed wood is called "cull" and is left in the woods after harvest because it is unfit for manufacture into wood products. In Oregon and Washington this loss adds up to over 1.2 billion board feet each year. Over 90 percent of this loss is in old-growth timber. This means that heart rots should decrease as more and more second-growth trees are used for wood products. In some species such as white fir, even the second-growth or younger trees are susceptible to heart rot.

Control of the heart rots is accomplished by maintaining healthy vigorously growing forests and by preventing wounds. In campgrounds where decayed trees are liable to fall, the detectable rotten trees must be removed.



OTHER DISEASES

CANKER DISEASES, STEM RUSTS, and FOLIAGE DISEASES are other important diseases of forest trees. They are caused by fungi and spread by airborne spores. Each year in Oregon and Washington, they cause an estimated loss of 31 million cubic feet. They are especially damaging in forest plantations and Christmas tree plantings.

Cankers and stem rusts invade the inner bark and cambium of branches and tree trunks greatly weakening or killing the tree. They are major causes of hazardous trees in recreational areas.

Foliage diseases kill the needles or leaves which produce food for the tree. Repeated attacks in successive years reduce tree growth. Ultimately the tree may die or weaken and fall prey to insects or other diseases.

Control of these diseases is mainly through good forestry practices—planting the proper tree species or variety in the right environment and removing infected trees during cultural operations. Breeding disease-resistant trees also is used for control.



NONINFECTIOUS DISEASES

NONINFECTIOUS DISEASES such as air pollution, drought, temperature extremes, and drying winds also affect the health of trees. No estimate has been made on how much damage these agents cause, but it is sizeable. Probably the most serious consequence is that they increase the susceptibility of trees to insects and infectious diseases. Large bark beetle epidemics often develop and some root diseases are known to increase in drought-weakened trees. In Oregon and Washington, air pollution has not yet caused extensive damage to the forests, but it may if air pollution continues to increase.

"Red belt," is a phenomenon in which the trees in a certain elevational area on a mountain turn red in the spring. It results from a warm dry wind during the winter. This causes water to be evaporated from the needles faster than it can be replaced. Such trees are usually weakened and may even be killed if the damage is severe enough.

The only control for noninfectious diseases is to maintain healthy vigorous forests. Healthy trees are generally better able to recover after damage than are unhealthy ones. Growing the proper species of tree is essential. Trees planted outside their natural area are very susceptible to damage by noninfectious diseases.



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